POSTER SESSION

1134 Echocardiography and Imaging in Pediatric and Congenital Heart Disease

Tuesday, March 09, 2004, 9:00 a.m.-11:00 a.m.
Morial Convention Center, Hall G
Presentation Hour: 9:00 a.m.-10:00 a.m.

1134-199 Utility of Echocardiographic Gradient for Evaluating and Predicting Need for Intervention in Children With Valvar Aortic Stenosis

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Background: In pts with valvar aortic stenosis (VAS), the relative accuracy of peak versus mean echocardiographic gradients (EC) for predicting peak-to-peak catheterization gradient (CG) is controversial, as is the relative accuracy of EC samples obtained from apical (AW) versus suprasternal or high parasternal window (HW).
Methods: We reviewed EG and CG data from 79 children (aged 9.5±5.9 yrs) with isolated VAS, recording the peak (AW_{peak}, HW_{peak}) and mean (AW_{mean}, HW_{mean}) EC and compared these with the CG. We recorded the need for intervention at catheterization.
Results: All EG estimates correlated in a linear fashion with the CG and with each other (R^2=0.34-0.86; p<0.001).However, the correlations were suboptimal (0.58 – 0.63), demonstrating unpredictable over- or underestimation of the CG. AW_{peak} provided the closest overall estimate. HW_{peak} and HW_{mean} were generally higher than the corresponding AW_{peak} and AW_{mean} at high CG but showed little difference at low CG. AW_{peak} and HW_{peak} overestimated the CG in 60% (10 mmHg mean) and 86% (19 mmHg mean), respectively, whereas AW_{mean} and HW_{mean} underestimated the CG in 94% (23 mmHg mean) and 83% (16 mmHg mean), respectively, with errors as high as 70 mmHg. No independent variable (e.g., age, CG, window, peak versus mean) was associated with the magnitude of error. Of the 79 pts, 58 (67%) underwent balloon aortic valvuloplasty. No single EG method was adequately predictive of intervention with the area under the ROC curve = 0.79-0.80. No pt satisfying either of the following equations underwent intervention ($AW_{peak} \leq 107\text{-}1.05^* HW_{peak}$; $AW_{mean} \leq 63\text{-}1.6^* HW_{mean}$), and all pts satisfying either of the following equations did ($AW_{peak} \geq 114\text{-}0.56^* HW_{peak}$; $AW_{mean} \geq 64\text{-}0.55^* HW_{mean}$). In approximately 50% intervention could not be predicted.
Conclusion: In children with isolated VAS, apical and suprasternal notch samples are not equivalent with HW_{peak} overestimating CG more than AW_{peak}. Both peak and mean EG frequently and unpredictably over- or underestimate CG. Although pts at high and low CG who did and did not have intervention could be predicted, we were not able to determine a reliable predictive equation for the 50% of pts with CG in the middle portion of the spectrum.

1134-200 Myocardial Performance Index in Pediatric Patients With Primary Pulmonary Hypertension: Correlation With Pulmonary Artery Pressure and Response to Vasodilators

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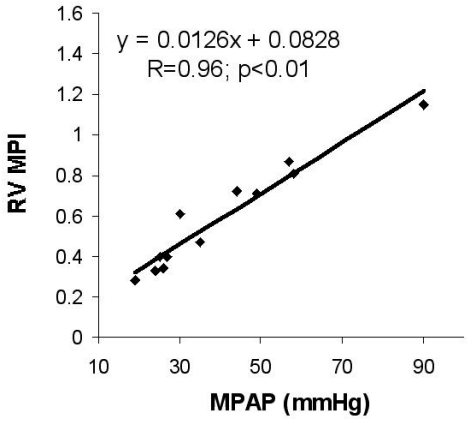
Background: Management of primary pulmonary hypertension (PPH) relies on invasive measures of PA pressure (PAP) and resistance (PVR). Echo myocardial performance index (MPI) [(isovolumic contraction + relaxation time)/ejection time], a measure of global ventricular function, predicts outcome in adult PPH. This study determined the utility of MPI in assessing RV dynamics and PA reactivity in pediatric PPH. Methods: RV and LV MPI were measured in 12 patients (pts) with PPH (PVR=12.1±16.4 wood units x m^2) at or near initial catheterization and at a mean of 14 months after vasodilators. Pts were divided into responders (resp) defined as ≥20% decrease in echo-estimated PAP and non-responders (non-resp). Results were compared to 11 age-matched controls. MPI in PPH pts was compared to mean PAP at cath. Results: Baseline MPI was elevated in PPH pts vs controls for the RV (0.69±0.32 vs 0.36±0.08; p<0.01) and LV (0.44±0.15 vs 0.34±0.05; p=0.03). Resp (n=5) had a mean drop in RV MPI of -38% (range= -20 to -63%) after therapy while non-resp (n=7) had a mean increase of 33% (range= 3-110%). The LV MPI did not change. RV MPI correlated with mean PAP at cath. (Fig.) Conclusions: 1) RV MPI is elevated in PPH indicating RV dysfunction; 2) it decreases with response to vasodilators; 3) it correlates well with mean PAP. This index is useful for assessing RV function in pediatric PPH and monitoring response to vasodilators. It appears to correlate with mean PAP and can be an alternative in pts without measurable tricuspid regurgitation.



1134-201 Strain Echocardiography Predicts Reduced Ventricular Function in the Systemic Right Ventricle

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Background: In certain congenital heart defects, the morphologic right ventricle supports the systemic circulation (systemic RV). RV failure is common and occurs gradually in these patients. Accurate evaluation of RV function and early detection of RV systolic failure would greatly assist clinical management. Strain echocardiography (SE) is a novel echocardiography technique that is able to quantify ventricular function. We tested whether SE is feasible and reflects RV systolic function in systemic RV. **Methods**: Conventional and SE was performed on consecutive patients with systemic RV (n=7) reporting to the adult congenital heart disease clinic and on age-matched, healthy controls (n=19). Standard echocardiographic projections were used for conventional echocardiography. For SE, narrow sector and high frame rate imaging of the RV free wall was performed in the apical 4 chamber view. Longitudinal strain rate and strain of the RV free wall was measured. **Results**: Mean age was similar in patients and controls. Ejection fraction was reduced in patients with a systemic RV compared to controls. Adequate quality SE images were obtained from all patients after a short learning curve. RV strain and strain rate were significantly lower in patients with systemic RV compared to controls (Table). **Conclusion**: SE is feasible in patients with systemic RV and is able to accurately reflect reduced systolic function in a systemic RV. SE may be a useful quantitative technique to follow RV function in patients with systemic RV.

	RV Strain (%)	RV Strain rate (s^{-1})	Ejection Fraction (%)
Systemic RV (n = 7)	-16 ± 6.8	-1.6± 0.44	37 ± 8
Controls (n = 19)	-26 ± 14	-2.1± 0.7	63 ±14
p-value	0.03	0.04	0.03

1134-202 Echocardiographic Screening for Clinically Silent, but Potentially Life-Threatening Coronary Anomalies

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Background: Some congenital anomalies of coronary artery origin may first present catastrophically with sudden cardiac death. In 1992 we introduced in our laboratory a standard comprehensive examination protocol mandating high-resolution magnification and low-velocity optimized color flow mapping of the coronary artery origins and proximal course. We sought to determine the extent and variety of potentially silent coronary anomalies detected by this protocol. Methods and Results: An echocardiographic database review was conducted of all pediatric patients examined from 1/92 to 1/03. There were 407 pts diagnosed with coronary artery abnormalities. The 358 pts with acquired coronary disease, clinically evident coronary anomalies or conotruncal malformations commonly associated with coronary anomalies were excluded. The remaining 49 pts had potentially silent coronary anomalies; 25 of these anomalies occurred in structurally normal hearts. Associated simple congenital heart defects in the remainder included atrial septal defect -7, ventricular septal defect-12, aortic coarctation-5, atrioventricular canal-1, aortic stenosis-1, pulmonary stenosis-1 and mitral prolapse-2. The most common anomalies were tiny coronary artery fistulae-14, right coronary artery (RCA) origin from the left sinus of Valsalva (SOV)-11, and high-takeoff of the RCA above the SOV-9, an anomaly associated with potential myocardial injury if undiagnosed prior to undergoing cardiopulmonary bypass with cardioplegia. The others were: single RCA-6, circumflex off the RCA-4, left coronary artery (LCA) from the right SOV-2, high takeoff of the LCA-1, high takeoff of both coronaries-1, and single LCA-1. All wrong sinus coronary origins took an interarterial course. Three single RCA cases were diagnosed prospectively with an intraseptal course of a left coronary artery. Conclusions: An echocardiographic screening protocol which mandates routine comprehensive examination of the coronary artery ori-